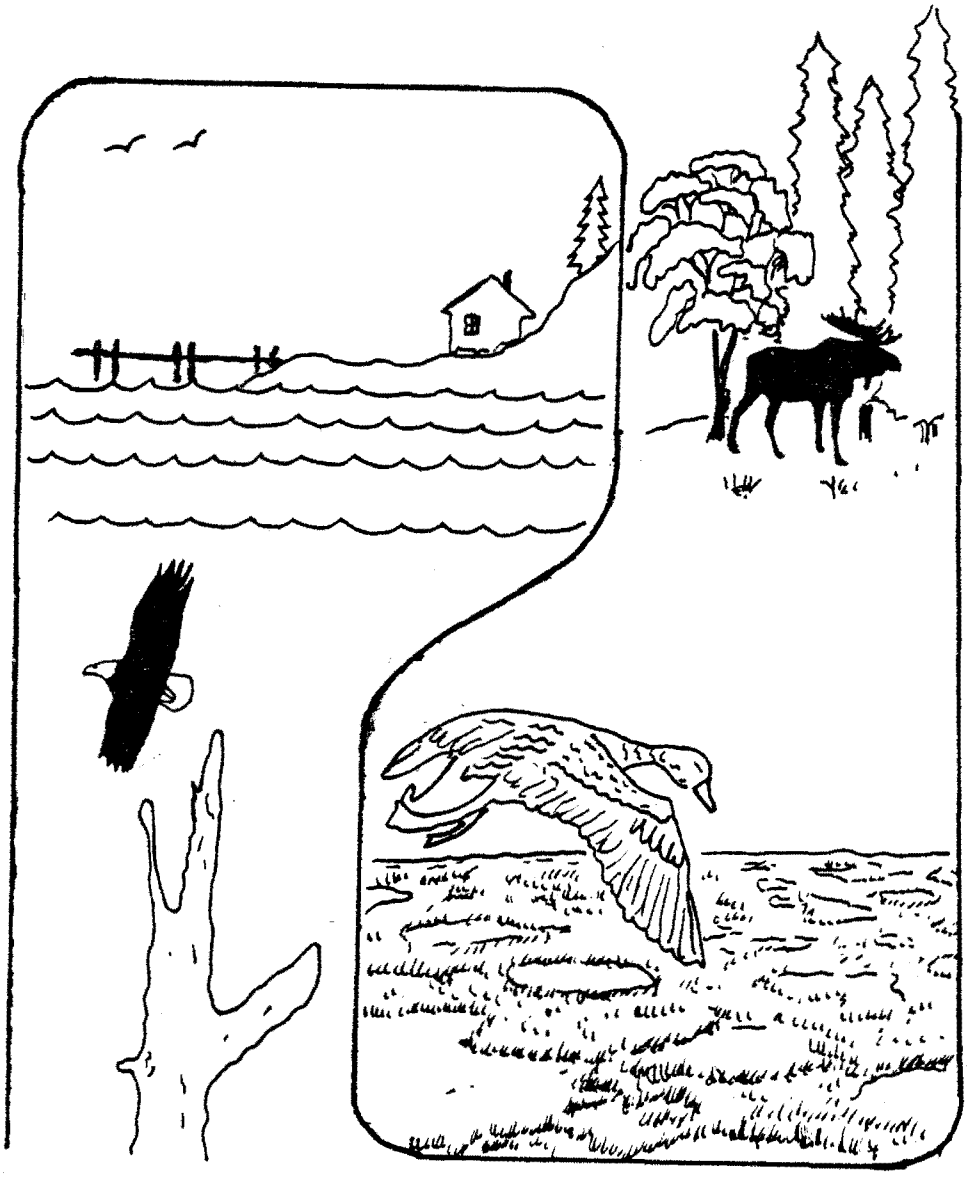
GUIDELINES FOR WILDLIFE DESIGN

IN RESIDENTIAL DEVELOPMENTS



HABITAT PROTECTION SECTION

ALASKA DEPARTMENT OF FISH AND GAME

GUIDELINES FOR WILDLIFE DESIGN

IN RESIDENTIAL DEVELOPMENT

Prepared by the Habitat Protection Section

Alaska Department of Fish and Game

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FOREWARD

This report was prepared to provide guidance to planners and engineers during the design of subdivisions in Alaska. The guidelines provide a procedure and basic concepts for including fish and wildlife concerns in the design of residential developments. The Department of Fish and Game encourages individuals who are planning residential developments to contact our regional Habitat Protection Section offices for specific assistance and wildlife information.

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ACKNOWLEDGEMENTS

Procedures outlined in this document are based on the research and findings of the Urban Wildlife Research Center, Ellicott City, Maryland. U.S. Fish and Wildlife Service, Biological Service Program report, (FWS/OBS-77/66) "Planning for Wildlife in Cities and Suburbs" by Daniel L. Leedy, Robert M. Maestro and Thomas M. Franklin is highly recommended as an additional information source for land planners and resource developers in Alaska.

INTRODUCTION

The primary means of accommodating wildlife and recreation through residential planning is the cluster or planned unit development approach to site design. This approach to site design significantly increases the potential for continued wildlife amenities within the project area because of the amount and diversity of open space typically provided. It also allows greater opportunities for integrating wildlife because of flexibility in design process and general requirements for preservation of natural features, community parks and trails, and greenbelts along waterbodies. However, wildlife planning must go beyond identification of important habitats and their incorporation into an open space system. Consideration also must be given to design of open space systems, the types and locations of all design components (including infrastructure), and proposed management policies and practices.

The following is an outline of a procedure for incorporating wildlife considerations into site design -- one that does not require significant readjustment of conventional planning approaches. It begins with the identification and analysis of relative habitat types and continues through the siting of design components and architectural considerations. A deliberate attempt is made to prescribe an approach that can be accommodated by the normal complement of site designers, landscape architects, and environmental planners employed by most planning firms involved in land development.

The types of techniques and methodologies requiring a consulting wildlife biologist have been minimized or modified where possible. However, planners

are urged to obtain firsthand assistance from wildlife biologists to ensure a well-integrated planning effort.

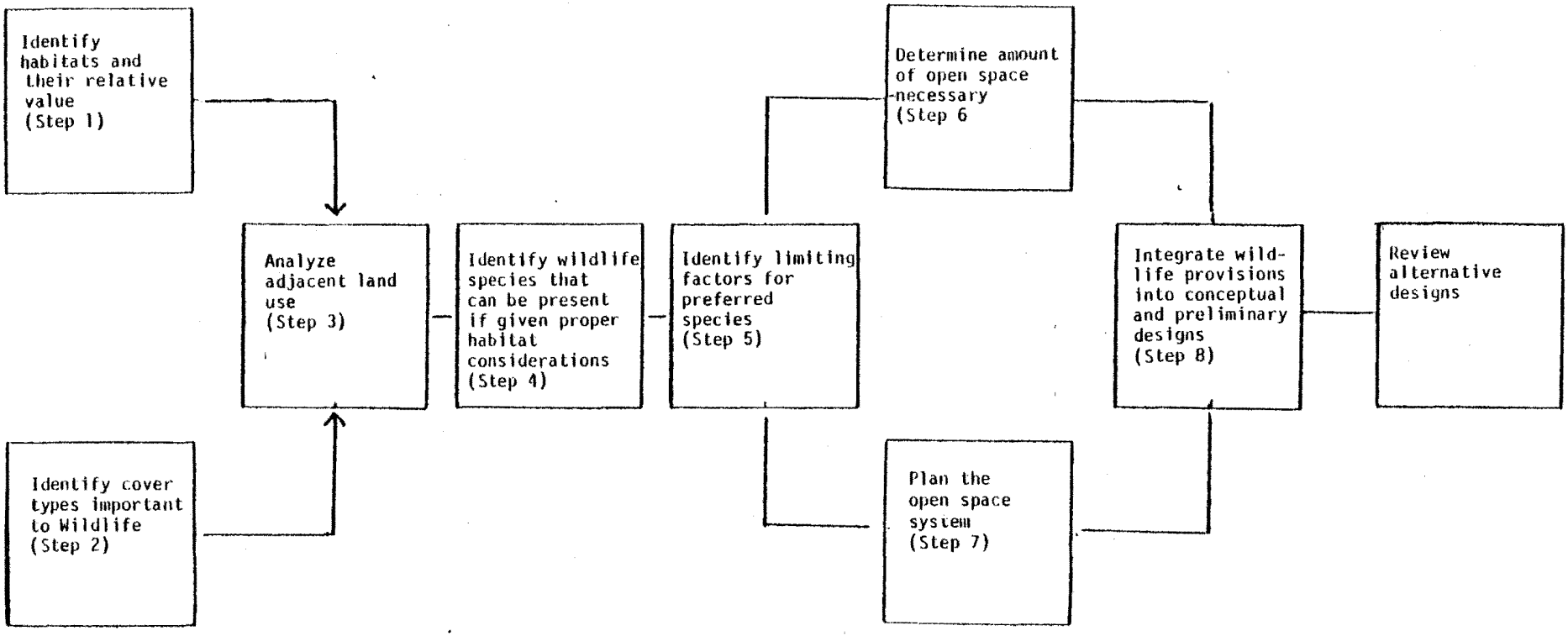
STEPS IN WILDLIFE PLANNING

The proposed methodology for wildlife planning involves an inventory of existing conditions followed by an analysis of the findings and their incorporation into the structure of the open space system and other components of the conceptual and preliminary designs. The steps in the procedure are detailed below and summarized in Figure 1.

Step. 1. Identify habitats on the site and determine their relative value for wildlife.

The first step in integrating wildlife into site design is to determine types of habitats that exist on site, their relative values, and their potential for development. Each fish and wildlife species is adapted to living in a specific environment or habitat. Some species have broad tolerance to variations in soil, water, vegetation, and climate and occur in wide geographic ranges; others are restricted to rather specific ranges or habitat types. There are aquatic species and terrestrial species; species that have small home ranges; and those that require large areas to survive. Some are adapted to living in wooded areas; others to grasslands; and many prefer edges or ecotones between one type of vegetation and another.

Figure 1. Flow diagram of process for integrating wildlife considerations into the site design of residential land developments.



Habitat types for site planning can often be identified, in part, from good vegetation maps and categorized . The purpose of defining habitat types at a site is to distinguish between areas that differ with respect to types of wildlife species present and/or their value to wildlife in general. Sensitive types such as streams and creeks, wetlands, floodplains and riparian habitats should be identified for protection.

The relative value of the different habitat types at a site can be determined in many ways. One basic approach is to compare those present with habitat types in the general area. Because of the importance of habitat diversity, those that are limited with respect to the general area should be considered of high value to wildlife. For larger sites--i.e., more than 160 acres--those habitat types that are limited compared to all types present on the site should be be given special consideration.

Some indication of the relative value of different habitat types also can be obtained by listing the species in the region that could exist in the new community and the habitat types for which they show a strong affinity. Information on species and habitat can be obtained from sources such as regional field guides i.e. Alaska Wildlife and Habitat series, and other pertinent literature, plus consultation with local wildlife biologists.

Whenever possible the planner should obtain the assistance of biologists in defining wildlife habitats present, determining their relative importance, and identifying which species may be able to be retained on the site. Often such assistance can be obtained from area wildlife biologists with

the Alaska Department of Fish and Game or U.S. Fish and Wildlife Service, from the fisheries or wildlife departments of the University, or from the local Audubon or natural history societies.

Step 2. Identify plant species of importance to wildlife as food sources, escape cover, and nesting habitat.

Plants of all types are important to wildlife, from the single-celled bacteria and algae to trees. However, in connection with residential wildlife planning, the seed-producing species are particularly important in that they provide food, cover, and nesting sites.

In Step 1, guidance was given for determining the relative value of various habitats. Identification of important habitat types forms the basis for wildlife planning, but this should be supplemented with information on specific plant species. Their value to wildlife can then be integrated with habitat selection in determining which plant species to retain and which are preferable for supplemental planting and landscaping.

The choice of habitat types must include consideration of the importance of particular plant species to wildlife. This is particularly true during periods when their normal food supply is limited--e.g., during winter. The availability of a food source near cover should also be a consideration in identification and selection of areas for producing and raising new generations of most wildlife species.

Step 3. Analyze adjacent land uses.

Planning for wildlife in relation to site development must take into consideration what exists adjacent to the site as well as at the site itself. Many additional wildlife benefits can be derived from adjoining open space areas that can serve as potential habitats or refuge areas for species on the site. Maintaining movement corridors through the site will not only enhance the potential wildlife amenities within the proposed development but also will help realize the potential for maintaining wildlife amenities of adjacent areas and the region as a whole.

An existing site in its undeveloped state can not only act as a refuge area for wildlife but provide access for wildlife to adjacent areas if left as part of a connective open space system. Such sites need to be identified and an open space system planned so as to maintain a continuous wildlife corridor. By tying the development to adjacent open space or undeveloped areas, species requiring larger home ranges can be accommodated. Such open space areas could include, for example, national or state forests, natural areas, special wildlife management areas, parks, protected stream corridors, or military reserves.

Step 4. Identify species on the site and in the region that could be present if proper habitat were provided.

Although various methods have been devised for determining the types and populations of wildlife existing in an area, their application usually requires trained biologists or people working under the supervision of

such biologists. When budgetary and scheduling constraints do not permit use of biologists, secondary data sources can be used, and local naturalists or fish and wildlife biologists can be contacted regarding the availability of source materials and for help in interpreting the information.

The process basically becomes one of listing those species whose geographical range includes the proposed site and for which preferred habitats exist either on or adjacent to the site.

For many sites, it may suffice to list only those species identified as common or frequent inhabitants. The planner should be alert, however, to the possibility that the development may further endanger threatened or pcrotected species, i.e. eagles, peregrine falcons, trumpter swans, and should take every precaution possible to preserve their habitat.

Conversion of an undeveloped area into a residential area will further decrease the amount and types of essential habitat available. However, when site planning provides for development of ponds, lakes, or other habitats that presently are limited in the area, species adapted to such habitats may benefit.

Step 5. Identify limiting factors for preferred species.

Although identifying and retaining habitats for preferred species can result in their continued production, it may also result in a decrease

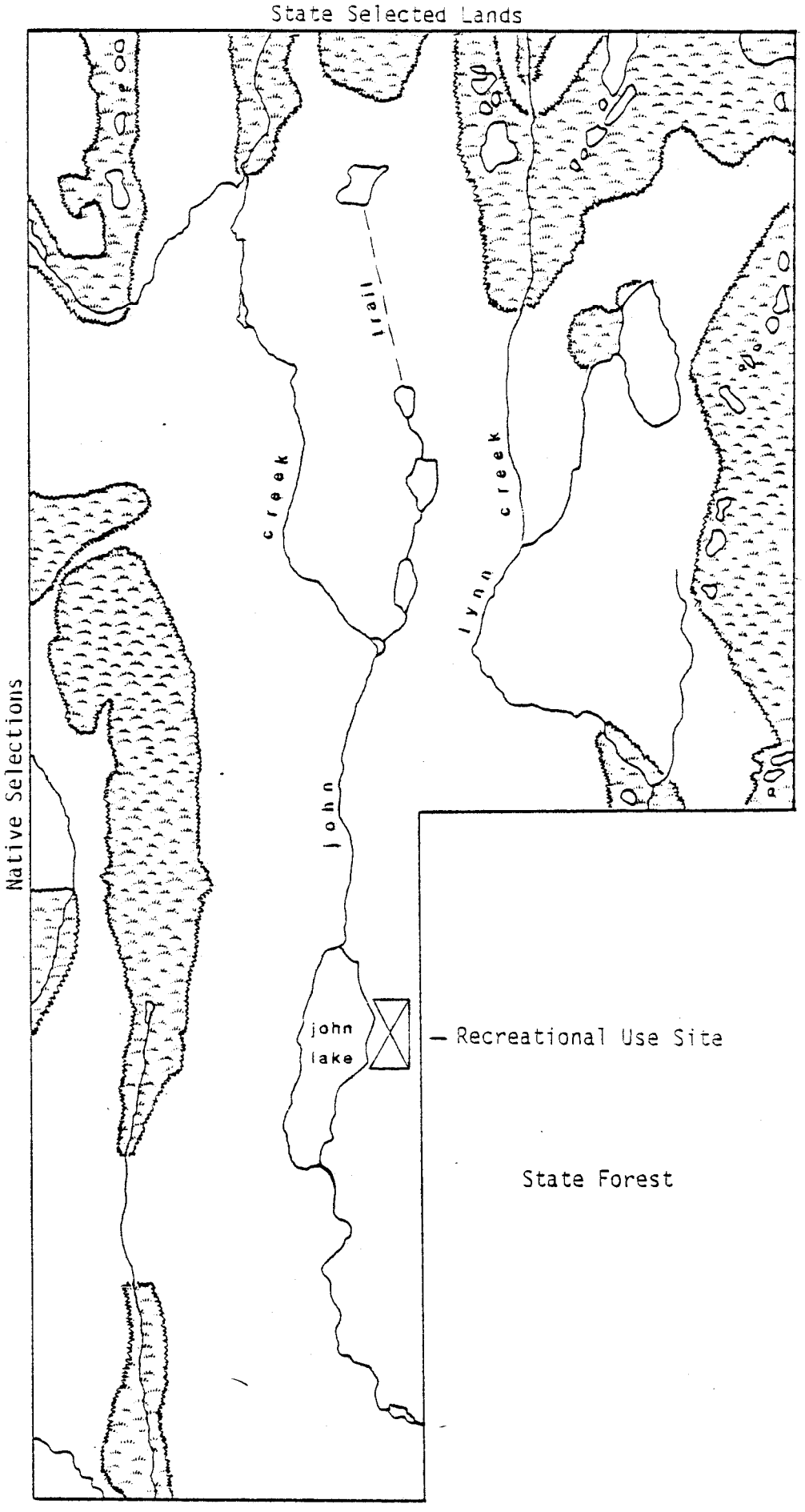


Figure 2. Integrate adjacent land use.

of other wildlife. Each individual species or group of species has its own particular requirements that must be satisfied to ensure its retention within the proposed development.

Performing the previously described steps does not guarantee that specific species will be retained at all. In order to ensure retention of individual species or groups of species, existing conditions within the site must be analyzed in relation to the specific requirements of the species. Any limiting factors must be identified and methods prescribed for their incorporation into the design or management system for the proposed development.

Since it is impractical to define here the limiting factors for all species, area wildlife biologists should be contacted for assistance in each project.

Step 6. Determine how much open space is necessary.

The amount of open space required is difficult to determine. Each species has a home range within which it satisfies all of its requirements. Although the home range of many species in the wild has been defined, little knowledge presently exists on how much area these same species would require in order to be retained within developed areas. However, it is apparent, that home range requirements can be accommodated on residential sites for some species because many Alaskan species live within existing residential areas.

One of the main factors influencing home range requirements within residential areas is the effect of human disturbance. Species such as the raven, many songbirds, and the red squirrel have adapted well to the presence of humans; many other species are more sensitive. To help ensure that the retention of the more sensitive species, acreage greater than that required under natural conditions may be needed to buffer or screen against human disturbance.

Unfortunately, it is impractical for many reasons to list the home range for all wildlife species. For one, data either do not exist for all species or samples taken have been too few to be conclusive. Determinations made for a species in one geographical area may not be applicable for other parts of the State and the size of a home range for any one species in a given area may vary greatly according to the conditions present.

Thus, while no absolute answer can be given as to how much area is required until further research data are available, it can only be assumed that the larger and more diverse the open space is within a developed area, the more wildlife there is likely to be. As indicated previously, acreage can be maximized by connecting the open space system with undeveloped areas adjacent to the site.

Also, size requirements can be compensated for to a certain degree by concentrating efforts toward providing high quality habitat. This can be achieved by proper selection of habitat types to be retained in open space areas and by taking into consideration the limiting factors of

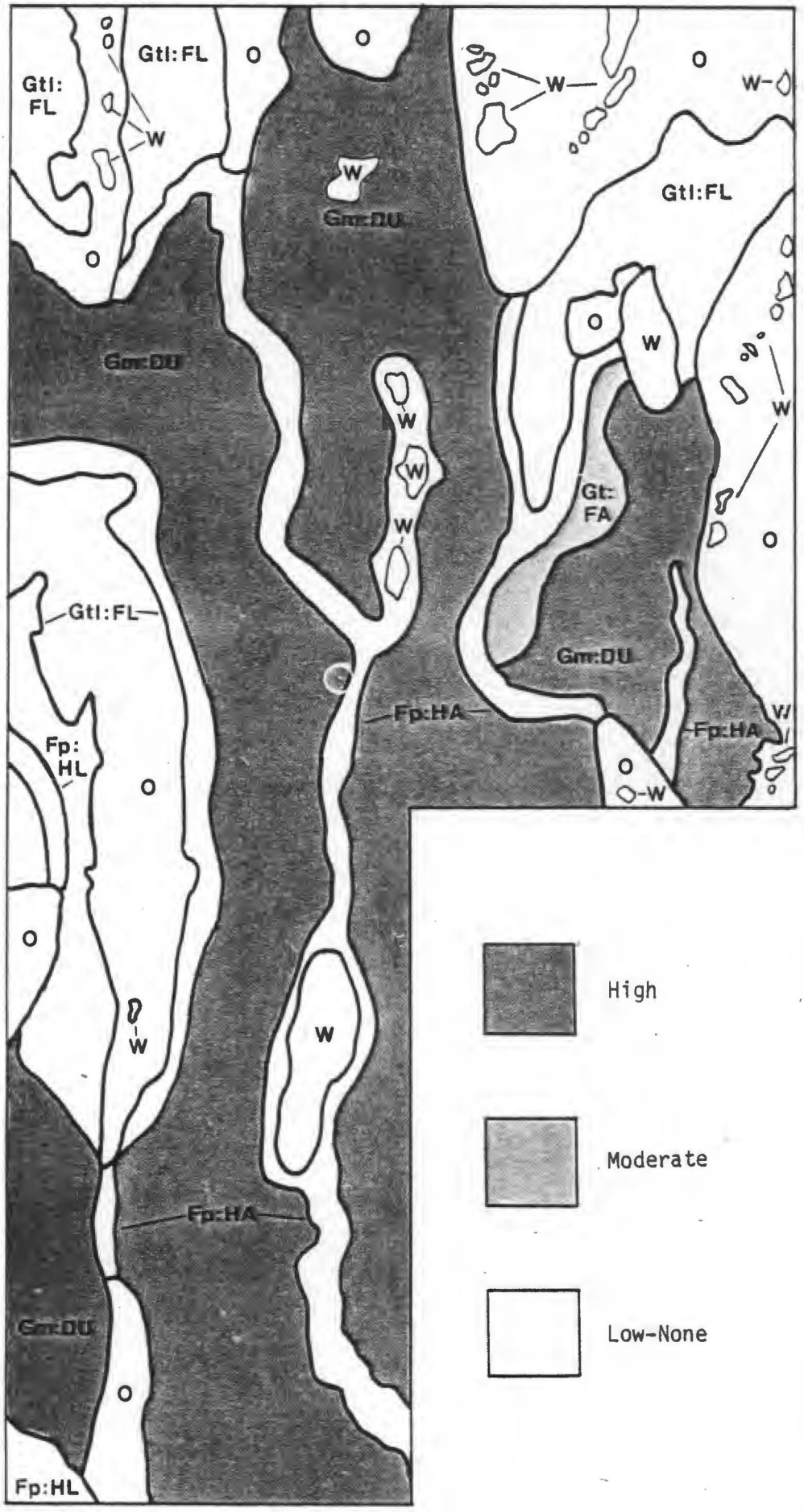


Figure 3. Assessment of development potential.

preferred species. It should be apparent, also, that the way residents of an area manage the vegetation on their individual lots will have a major bearing on the wildlife in the community.

Step 7. Plan the open space system.

Once the existing conditions that affect wildlife have been identified on site and within the adjacent area, one can proceed to integrate wildlife into the design of the open space system. In most cases, it will be impossible to incorporate all of the habitat types identified earlier. Frequently, these habitats would occupy greater acreage than is economically feasible to retain. Also, they may coincide with areas that are valuable for development.

Therefore, integration of wildlife habitats into the open space design must begin with those areas that normally would be retained, irrespective of wildlife. These include floodplains, steep slopes, wetlands, utility line and road rights-of-way, and other areas intrinsically unsuitable or economically undesirable for development (Figure 3).

However, once the basic structure of the open space system is formulated, additional habitat types can be integrated, either as recreational/aesthetic components (e.g. ponds, lakes, community parks, trail corridors, and wood lots) or as part of the more detailed planning associated with the design components. Also, special landscaping techniques can be applied to large and small open space areas to increase their value to wildlife.

Because areas most likely to remain undeveloped must form the spatial framework for wildlife, the task now becomes one of analyzing this acreage to see what modifications/additions can be made in light of the knowledge obtained in Steps 1 through 6. It is recognized that certain limitations exist that bear on the amount and location of open space that can be retained. The areas defined in Step 1 as valuable to wildlife must be integrated into this framework as well as possible within the limitations imposed. This task naturally becomes more difficult as the amount of land most likely to remain undeveloped approaches the percent of open space allowable.

One should not assume that these undeveloped areas have limited value to wildlife simply because wildlife is not a consideration in their retention. Quite the opposite is true, particularly in the case of wooded or semiwooded floodplains and wetlands. The ecotone formed between the acquatic and woodland habitats provides exceptional benefits to wildlife. The soil moisture available in floodplains frequently allows for more luxurious growth of understory species, thereby providing additional cover and screening from human disturbance.

In utilizing the undevelopable land, the first thing is to see whether it forms a continuous open space/wildlife corridor system that is connected with adjacent open space parcels. If not, interconnecting parcels of open space should be incorporated. The most valuable habitats and groups of plant species should be used. As many corridors as possible should be provided through the site. Frequently, many are possible because of the existence of streams and related floodplains.

Where these are minimal or nonexistent, primary consideration should be given to maintaining continuity with any corridor presently existing within the immediate area and contiguous with the site.

Where possible, efforts should be directed toward developing or retaining at least two major corridor systems that are generally perpendicular to each other and meeting near the center of the site. The purpose of this type of system is to make an equitable distribution of wildlife amenities throughout the proposed development (Figure 4).

All corridors do not have to be equal in width, but at least one major corridor should be provided. It should be selected as the one that connects with the largest undeveloped tracts of land adjacent to the site. The primary corridor can then be supplemented with secondary and tertiary corridors of smaller size. These ancillary corridors extend from the major system into and through the site, encouraging the movement of wildlife into and through residential areas.

Only the primary and possibly some of the secondary corridors can be defined at the early planning stages. The tertiary corridors and at least some of the secondary corridors will have to be defined more practically as the preliminary design plans are developed. Their integration probably will continue into the final design stages (Figure 5).

Planning the open space system of a site for which an open space framework already exists--stream corridors with attendant floodplains, wetlands,

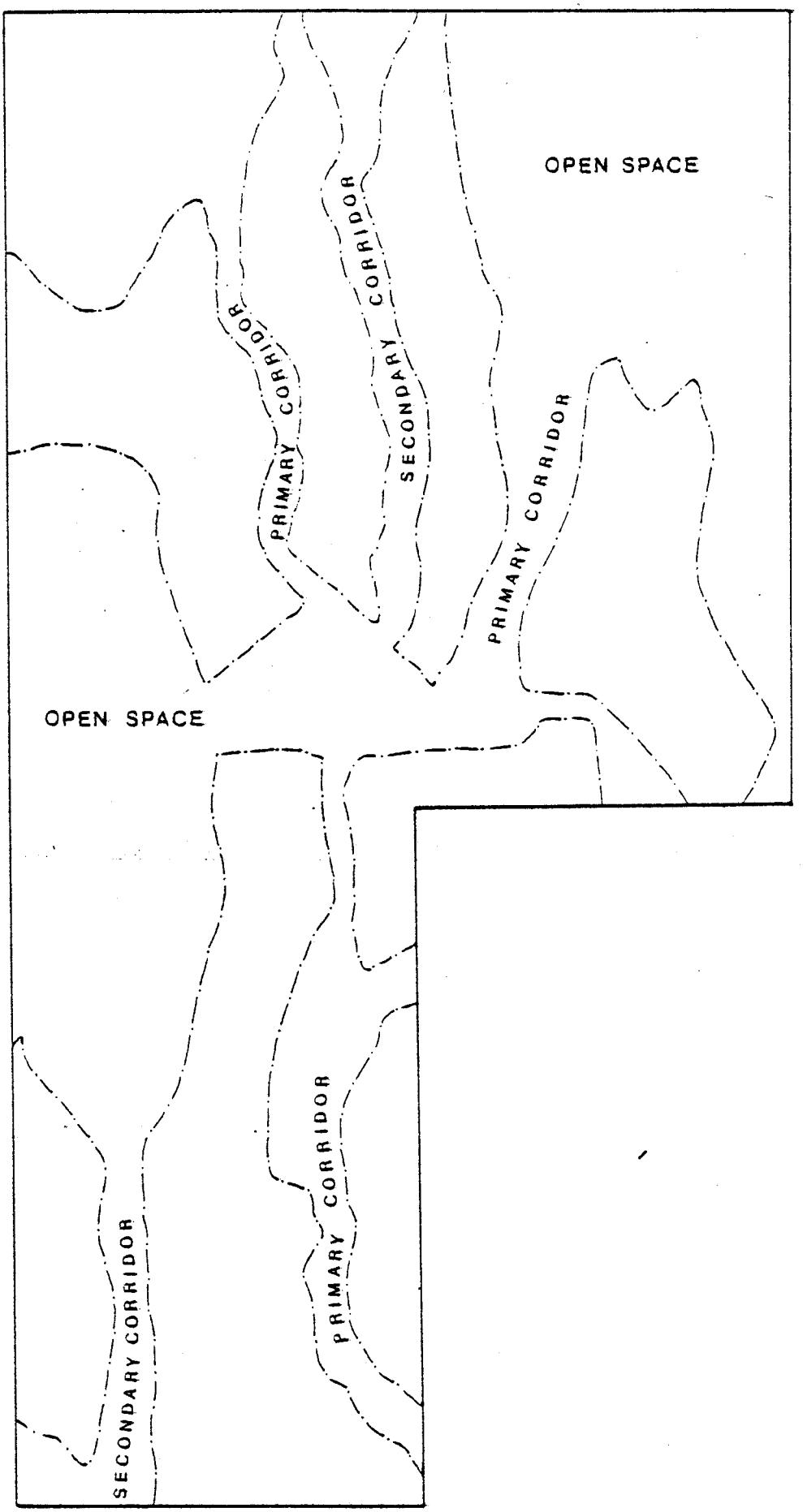


Figure 4. Plan the open space.

steep slopes, and so forth--calls for a different approach than a site where few preexisting determinants are present. In this first case, little opportunity may exist for incorporating additional preferred habitats.

As mentioned previously, the amount of latitude available is dependent upon what percentage the predetermined open space represents compared to the amount allowable economically. Any difference should be augmented with the most valuable habitats that remain. If the total acreage allocated for open space is already appropriated, a readjustment in unit densities may be justified if additional acreage can be demonstrated to improve wildlife amenities significantly for the development.

Step 8. Integrate wildlife considerations into the conceptual and preliminary designs.

Thus far, guidance has been given on how to structure the open space system to derive maximum benefits for wildlife. Although this may be considered as a major accomplishment, the process should not end here.

The relationship of the design components to the open space also is an important consideration. Many of the wildlife benefits anticipated in the planning stage may not be realized if wildlife considerations are not carried through into the design process.

Two major areas of concern must be addressed with respect to the design components. These are (1) minimizing adverse physical impacts on components

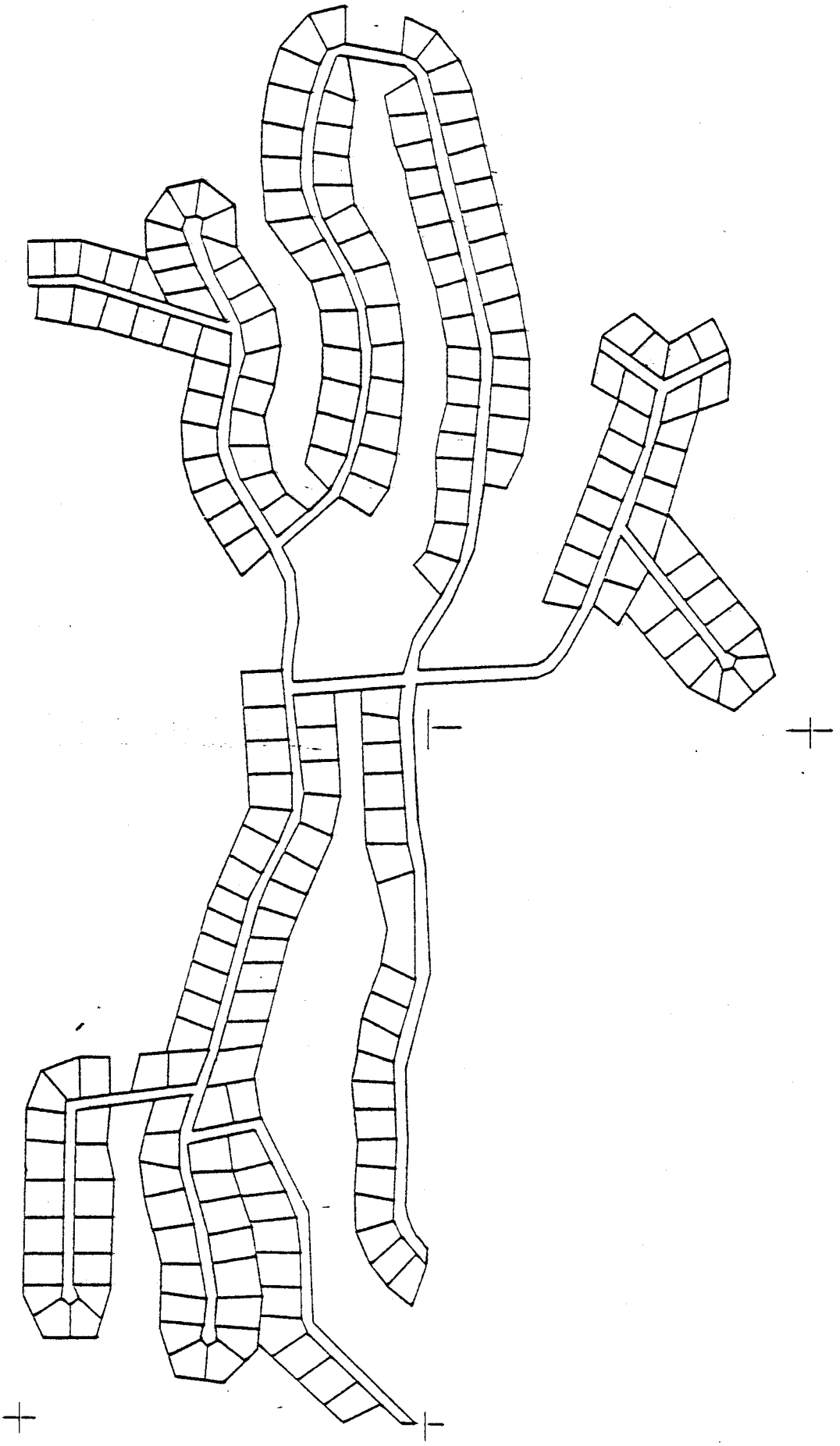


Figure 5. Incorporate open space into design.

of open space system that are important to wildlife and (2) minimizing the effects of human disturbance.

a) Minimizing Physical Impacts.

As a very basic rule of thumb, all efforts should be made to minimize adverse impacts on any component of the open space system. Particular care must be taken to minimize any breaks in the open space/wildlife corridor system, particularly those caused by roads and highways. It is recognized that most roads designed in association with site planning serve some type of development on both sides. In some cases, such as entrance roads to the development, and segments of major arterials, efforts should be made to align road segments in such a way as to help buffer human disturbance to wildlife areas and to restrict access.

Where crossing the open space system cannot be avoided, roads should be planned in areas where the open space system is narrow. Large wooded areas should be kept intact to maximize their utility as refuge or sanctuary areas.

Road width plays an important role with respect to wildlife. A study by OxLey, 1974, on the effects of roads on the movement of small and medium-sized mammals in forested areas suggested that divided highways of 90 or more meters (293 feet) in width may provide a barrier to movement comparable to a water body of 180 meters (585 feet). Therefore, all efforts should be made to minimize crossing the open space system with major roads.

Where roads cross watercourses, culverts also may act as barriers to movement by fish and small mammals. Where the use of culverts cannot be avoided, they should be oversized or located so as to permit animal passage.

b) *Minimizing Disturbances.*

The reactions of wildlife to human disturbances such as noise and physical activities vary. Continuous noise and movement has little effect on most species, whereas discontinuous or intermittent types of disturbance may greatly affect wild animals. For example, most species can be approached quite closely by a moving vehicle. They will remain nearby as long as the motor continues to run and the occupants do not make sudden moves. But, as soon as the motor is shut off and someone gets out of the vehicle or the car door is slammed, the animal will make a quick exit.

In planning the areas surrounding an open space system, these components generating disturbances of an intermittent and discontinuous nature are of greatest concern, whereas those whose disturbance factor is more or less continuous are of less concern. Housing units and outdoor recreation activities are examples of the former; roads and highways represent the latter, even though traffic can cause considerable wildlife mortality.

RECOMMENDED CRITERIA FOR OPEN SPACE SYSTEMS

Common Open Space Components	Recommended Minimum Horizontal Widths	Comments
1. Primary Corridors		
A) Streamside management zones (e.g. greenbelts, riparian buffer zones or floodplain management zones) along streams and rivers.	60m from the mean flood flow (bankfull) flowline of each bank or the 100 year flood plain - whichever is larger. In general, the more prone a development is to increase pollution or sedimentation within the watershed, the larger the setback required given similar shoreline conditions.	Many wildlife species use riparian zones disproportionately more than any other type of habitat, and wildlife related human uses are also concentrated in these areas. Riparian habitat is important to wildlife for the following reasons: 1) it provides a higher diversity and production of plant species than is generally available on adjacent uplands, 2) its close proximity to a source of water, 3) it maximizes the development of edge, 4) it maintains microclimate essential to fisheries as well as many wildlife species, 5) it provides migration routes between high elevation summer range and low elevation winter range, 6) it serves as a water storage reservoir which regulates essential stream flow conditions, 7) it serves as a filter bed to remove suspended sediments from runoff, and 8) it creates by periodic flooding important disturbed habitats.
B) "Special" public trail corridors.	300m total width of corridor (e.g. 150m each side of centerline).	Special public trail corridors are established: 1) to provide enough space for multiple trails where incompatible trail uses must share the same corridor, 2) to provide opportunities for and enough space for facilities for support of of-trail recreational activities, 3) to protect abutting private property from high public use, and conversely, to protect public values for which the corridor was established from adjacent private property use, 4) to preserve natural scenery along the trail corridor, 5) to preserve a historical setting, and 6) to allow off-road travel over long distances.
C) Wetlands.	As a natural land form, minimum widths do not apply; however, because of the large amount of wetlands in Alaska, they will often constitute a major component of open space systems.	The intrinsic values of wetlands have been given national recognition via the Clean Water Act, Coastal Zone Management Act and Presidential Order. In addition to their vital role in the production of fish and wildlife, wetlands perform a far broader spectrum of biological and physical functions of value to people. Wetlands provide a natural flood storage capability, serve as ground water recharge areas, and tend to moderate the flow of associated rivers and streams. Lastly, wetlands are natural water purifiers which settle out suspended solids from water, absorb and recycle organic and inorganic constituents and contribute to increased water quality.

RECOMMENDED CRITERIA FOR OPEN SPACE SYSTEMS

Common Open Space Components	Recommended Minimum Horizontal Widths	Comments
II. Secondary Corridors		
A) Lake shorelines (e.g. lake shore greenways and greenbelts.)	60m lanward of the high water line along freshwater lakes with high fisheries values or potential. 30m landward from the high water line along freshwater lakes greater than 20 hectares. 15m landward from the high water line plus an additional 1.5m for each percent of shoreline slope for all lakes classified public and navigable waters.	Lakes and ponds are more than just standing bodies of water. They possess physical and chemical characteristics which make them ideal living space for a large number of Alaskan fish and wildlife species. Lakes also provide a wide array of recreational opportunities. However, a lake or pond cannot be separated from the drainage area that supplies its water. The drainage area consists of the uplands, shorelands and wetlands adjacent to the lake. Degradation of the quality of lakes is the result of the lake aging process - - - eutprophication and sedimentation - - - speeded by by cultural activities along their shorelines. These synergistic processes cause or aggravate some of the familar lake quality problems: massive aglae blooms, nuisance rooted-plant growth, foul odors, diminished usuable water surface, changes in fisheries and fish kills. Lake restoration techniques are very costly and often not effective; the best alternative is to prevent the problems that residential development often cause via land use practices which minimize nutrient loading and sedimentation in lakes.
B) Coastal shorelands (e.g. shorelands greenways and buffer zones).	60m landward of the mean higher high tide line.	Alaska's coastal shorelands provide numerous and often diverse fish, shell fish, and wildlife habitats. These habitats support the world's largest commercial fisheries and provide numerous and valuable recreational opportunities. Alaska's Coastal Management Program ACMP, requires that coastal zone habitats and fish and wildlife resources be maintained and protected.
C) Woodlots	The size and configuration of woodlots will vary for each site.	Managing forest lands to provide cabin logs or firewood in or adjacent to proposed subdivisions can be highly beneficial not only from the standpoint of meeting the need for timber resources but also from the wildlife habitat perspective. Selection of lands for woodlots should be done in consultation with State wildlife biologists and foresters, should include areas where forest regeneration capabilities are high, and generally should not include riparian forests.

RECOMMENDED CRITERIA FOR OPEN SPACE SYSTEMS

Common Open Space Components	Recommended Minimum Horizontal Widths	Comments
D) "Standard" trail corridor	90m total width of trail corridor.	Standard trail corridors are established: 1) to provide a single or multiple trails to be used by mutually compatible users, 2) to provide opportunities for on-trail or limited off-trail recreation activity, 3) to preserve historic sites and natural scenery, 4) to protect abutting property owners from existing or potential public use, and conversely, protect values for which the corridor is established from abutting private property use and development, and 5) provide for off-road trail related travel over middle distances usually less than 20 miles.
III. Tertiary Corridors		
A) Rights-of-way and easements (e.g. power corridors, pipeline corridors, side lot easements, watercourse easements, etc.)	Widths are variable depending on purpose and state or local requirements.	Although rights-of-way and various types of utility easements are not established for wildlife purposes, if intergrated into the open space design, can provide wildlife benefits. Establishing a diversity of wildlife habitat types within a continuous open space network is of primary importance.
B) Neighborhood trail corridors.	15m total width of corridor.	Neighborhood trail corridors are established 1) to provide recreation opportunities and an off-road transportation system serving the residents of a single neighborhood, and 2) to provide direct access between the majority of homesites and public recreation areas or corridors outside the neighborhood.